Mapping plant diversity in cocoa-based agroforestry systems to improve overall productivity
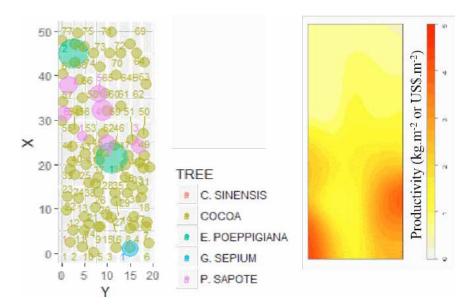
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L16.P.12

Mapping plant diversity in cocoa-based agroforestry systems to improve overall productivity

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In cocoa-based agroforestry systems (CAFS), the cocoa trees are associated with other culti-vated plant species at variable densities. There, the spatial distribution of the cultivated plants can be regular, random or aggregated, and their age may vary even in the same species. Variables of (i) density, (ii) spatial distribution and (iii) age can thus influence the overall pro-ductivity of CAFS and its distribution in space. We studied the relationships between these 3 variables and CAFS productivity based on data collected in 34 experimental yield tracking plots placed in agroforestry fields of producers in the Dominican Republic. A mapping of the cultivated plants was carried out on each plot at their installation and harvests of the ripe products of each individual plant were carried out every two weeks over a period of one year. The first results of this study indicate that optimal CAFS productivity can be maintained along a decreasing density gradient of crops, associated with cocoa tree ageing. In addition, regu-lar and random spatial distribution of all plant species may increase overall productivity. The analysis of the variability of cocoa, fruit, tuber and timber yields allows us to provide recom-mendations on the most suitable species and the optimal distance between plants to improve overall productivity and therefore the producer's income.

On the left, example of a schematic map of a 1000m² plot showing the position of each tree.
On the right, the illustration shows the productivity (agronomic or economic) and its distribution in the experimental set-up.

Keywords: Cocoa-based agroforestry systems, Planting density, Spatial distribution, Age, Productivity.

4th **World Congress on Agroforestry**
Strengthening links between science, society and policy

20-22 May 2019
Le Corum, Montpellier, France

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